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DownToEarth
FORTNIGHTLY ON POLITICS OF DEVELOPMENT,
ENVIRONMENT AND HEALTH

**Science
Reporter**



MK Yadav Sir

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Renew the generalised system of preferences

In the pantheon of obscure international trade terminology, the "generalised system of preferences," or GSP, has a special place. GSP refers to an approach that has been adopted by nearly all developed countries for roughly the last half-century to offer incentives for economic reform in developing countries through lower tariffs. Each developed country has customised its own GSP programme to identify qualification criteria it deems important in economic reform, although all ensure that their programmes are constructed to avoid harm to domestic production. In short, it is the oldest and most far-reaching approach to "aid for trade" in the modern multilateral trading system, embodied in the World Trade Organization.

Renewing GSP
What is unique about the GSP programme in the U.S. is that its authorising legislation periodically expires until Congress sees fit to renew the programme. New legislation is never an easy proposition, especially in a polarised environment, making bipartisan legislation a herculean endeavour. That is the case with GSP now. The U.S. programme expired in 2020 and despite repeated assurances of bipartisan support, it remains in limbo.

GSP can play a vital role in establishing stable market access for developing countries that otherwise struggle to tap into global trade flows. It can be especially valuable for small businesses and women-owned enterprises, thus helping to empower them beyond limited domestic markets. More recent analysis suggests that GSP is vital in offering alternatives to Chinese imports and providing an advantage to suppliers in trusted developing country markets. GSP criteria promote reforms on labour and environmental sustainability and intellectual property rights protection. GSP



Mark Linscott
is a Senior Advisor at the U.S.-India Strategic Partnership Forum and a former Assistant U.S. Trade Representative in the Bush, Obama, and Trump administrations

imports also help reduce the tariff bills paid by American companies, many of which are small- and medium-sized enterprises.

The coalitions of support in the U.S. are diverse. Last November, a bipartisan group of Florida members of the House penned a letter expressing their strong support for GSP renewal on an urgent basis, highlighting its importance in sourcing away from China and lowering the tariff bill for Florida's consumers and manufacturers. In an era of friendshoring and nearshoring, GSP can be an effective tool in pursuing new supply chain objectives. Surprisingly, there is even strong bipartisan support for restarting GSP talks with India.

U.S.-India trade relationship

While there should be no need to offer additional arguments in favour of renewing GSP without further delay, the U.S.-India trade relationship may help to put support over the top. It is accepted wisdom that GSP renewal would offer an avenue for wide-ranging U.S.-India trade negotiations that can help in vaulting the bilateral trade relationship from the \$200 billion it is presently at to a much higher level. It is clear there needs to be higher ambition on trade in order to take the U.S.-India strategic relationship even further.

Before the expiration of the GSP programme in 2020, negotiations between the Office of the U.S. Trade Representative and the Indian Ministry of Commerce and Industry had come close to sealing a wide-ranging deal. Estimates at the time suggested that an unprecedented bilateral trade agreement between the U.S. and India might cover as much as \$800 billion in trade, including medical devices, several agricultural commodities, corn-based ethanol used for fuel, and information technology products.

The U.S. and India have already come a long distance in their trade relationship. Yet the tools they have available to achieve this increase in trade are limited. Even

though India has gone into overdrive in negotiating free trade agreements (FTAs) with a wider circle of trading partners, including the European Union, the U.K., the European Free Trade Association, Australia, and the UAE, the Biden administration is clear that the U.S. will not negotiate FTAs with any country for the moment. There are several trade dialogues between the two, but these lack the leverage for a hard-nosed trade negotiation that can shoot for ambitious results. The private sectors in both countries are teaming up to increase investments in high-profile sectors across critical and emerging technologies from smartphone manufacturing to semiconductor production, but they lack the stability in regulatory certainty and ease of doing business that a strong, enforceable trade agreement can bring.

This is where GSP should come into the picture. Each side would have much to gain through negotiations on India's GSP benefits when the U.S. Congress acts to renew the programme. Short of a change in U.S. administration policy on negotiating FTAs again, no other trade tool or policy could be more effective with India than GSP.

Depending on what qualification criteria the Congress includes in the final renewal legislation, a GSP negotiation could cover trade in goods and services, protections for internationally accepted labour rights and restrictions on child labour, enforcement of environmental laws, and provisions on good regulatory practice and other areas relevant to ease of doing business.

As the U.S.-India strategic partnership continues to grow and the two countries play critical collaborative roles in the Indo-Pacific, they should aim much higher in their trade relationship. GSP is not the full answer to comprehensively achieving this, but it would be a strong statement of their mutual desire to be on this path.

GENERALIZED SYSTEM OF PREFERENCES

(Syllabus: GS Paper 3 – Economy)

Context: Renewal of the Generalized System of Preferences (GSP) is seen as a strategic move to foster extensive trade discussions between the United States and India, potentially enhancing bilateral trade ties.

Generalized System of Preferences (GSP)

- **About:** It is a preferential trade arrangement that allows developed countries to grant preferential tariffs to imports from developing countries. The largest and oldest U.S. trade preference program.
- **Act:** Established by the Trade Act of 1974.
- **Objective:** To promote economic growth in developing nations by providing them with easier access to the markets of wealthier countries.
- **Key features of GSP:**

- **Reduced or zero tariffs:** GSP offers reduced or zero tariffs on imports from eligible developing countries.
- **Product in GSP:** GSP including agricultural and industrial goods. However, the specific products eligible for preferential treatment can vary between countries and are subject to negotiation and agreement.
- **Eligibility:** Eligibility for GSP benefits is often based on certain criteria, such as the level of economic development, the country's adherence to certain international agreements, and compliance with specific labour and environmental standards.
- **Review and Renewal:** GSP arrangements are usually subject to periodic reviews and may need to be renewed or revised. This allows participating countries to assess the impact of the program and make adjustments as needed.

Significance of GSP Restoration for India:

- **Economic loss:** Due to loss Generalized System of Preferences (GSP) status. India loss \$5.7 billion worth of imports into the US that had duty-free status.
- **Crucial for Indian exporters:** GSP restoration is crucial for Indian exporters as it provides preferential tariffs, promoting export growth and trade relations between India and the US.
- **Restoring economic cooperation:** GSP restoration has been a recurring topic in India-US trade policy forum meetings, highlighting its significance in resolving trade issues and fostering economic cooperation.

- **Current India status:** India had lost GSP benefits (largest beneficiary till 2017) in 2019 when former US President began introducing radical trade measures citing widening trade gap with India and China.

Green credits: Govt nod to 12 projects, 24 under consideration

NIKHIL GHANEKAR
NEW DELHI, MAY 10

THE CENTRE has approved 12 greening projects under the Green Credit Program (GCP), which was notified last year as a market-based mechanism designed to incentivize voluntary environmental actions across diverse sectors, officials aware of the development said.

Estimates of 24 plans submitted by different state forest departments are under consideration, the officials said.

The government has been pushing the public sector undertakings (PSUs) to take a lead in registering for the programme, especially in mining heavy states, and is developing guidelines for third-party verification of projects under the scheme, sources added.

The GCP, notified on October 13, 2023, seeks voluntary participation in "environmental positive actions" such as afforestation, water conservation, waste management among others from PSUs, private industries, non-profits and individuals. The GCP's governance framework is supported by an inter-ministerial Steering Committee, and The Indian Council of Forestry Research and Education (ICFRE), Dehradun, which serves as GCP administrator, responsible for programme implementation, management, monitoring, and operation.

Those investing in these initiatives will earn green credits in return which they can trade on a



THE INDIAN Council of Forestry Research and Education is working on evolving a mechanism for third-party verification of greening projects. The council is looking at a timeline of another month to finalise a draft on third-party verification and if stakeholders who register under the scheme could be included in the monitoring panel.

platform. The greening activities will happen on degraded land parcels and state forest departments have identified over 10,000 hectares of degraded land so far.

Over the past few months, the Environment Ministry has held meetings with the PSUs to push for registration under the initiative, with a special focus initially on states such as Chhattisgarh, Madhya Pradesh and Odisha, where large forested areas have been diverted for mining.

Those interested in undertaking plantations have to first register on a government portal and the state departments then identify plots. A plantation plan and cost estimate are submitted to ICFRE, which clears final proposal. ICFRE is working on evolving

a mechanism for third-party verification of greening projects, sources from the government body said. "We are looking at a timeline of another month to finalise a draft on third-party verification. We are also deliberating on whether stakeholders who register under the scheme should be included in the monitoring committee," the source said.

Under the green credit rules, the ICFRE can deem an entity a 'designated agency' to carry out verification of activities executed under the programme. Discussions are also underway on evolving a definite mechanism on linking the green credits to the compensatory afforestation compliance of industries, a senior government official said.

The GCP has provided for exchanging the credits meeting compliance of compensatory afforestation. This refers to the legally mandated afforestation that industries and government agencies have to undertake on non-forest land equivalent to the size of forests that are felled.

Speaking on registration seen under the GCP so far, senior forest department officials from Maharashtra, Chhattisgarh and Madhya Pradesh said that PSUs such as the NTPC have registered for the greening programme in all three states. Other PSUs which have registered in these states include Western Coalfields Ltd and Power Grid Corporation of India in Maharashtra, South Eastern Coalfields Ltd and Indian Oil in Chhattisgarh and Coal India in MP.

Context: The Centre has approved 12 greening projects under the **Green Credit Program (GCP)**, which was notified last year as a market-based mechanism designed to incentivize voluntary environmental actions across diverse sectors.

Green Credit: It represents an individual **unit of incentive awarded for a designated environmentally beneficial activity**. This form of credit is attainable by various entities, including individuals, farmer-producer organizations (FPOs), industries, as well as rural and urban local bodies, among other stakeholders.

Green Credit Programme (GCP)

- **Launched:** During the 2023-24 budget as part of Mission LiFE.
- **About:** An innovative market-based mechanism designed to incentivize voluntary environmental actions across diverse sectors, by various stakeholders like individuals, communities, private sector industries, and companies.
- **Aim:** To incentivise environmentally conscious practices and promote a sustainable lifestyle through a market-based mechanism.
- **Implementation by:** The Ministry of Environment has released the draft 'Green Credit Programme Implementation Rules 2023' under the purview of the Environment Protection Act of 1986.
- **Traded on a domestic market platform:** Green credits generated through such actions can be traded on a domestic market platform.
- **Governance framework:** Supported by an inter-ministerial Steering Committee and **the Indian Council of Forestry Research and Education (ICFRE)** serves as the GCP Administrator, responsible for program implementation, management, monitoring, and operation.
- **Earn carbon credits as well:** Any activity generating green credits under the government's Green Credit Programme (GCP) will also receive carbon credits under the Carbon Credit Trading Scheme if it leads to the reduction or removal of carbon emissions.
- **8 Sectors:** Environment-friendly actions include tree plantation, water management, sustainable agriculture, waste management, air pollution reduction, mangrove conservation and restoration, Eco mark label development, and sustainable building and infrastructure.

Meitei Sagol: Manipur takes host of decisions to save its fabled equines from extinction

Context: The Government of Manipur has recently joined hands with various organisations and associations to save the Manipuri Pony or Meitei Sagol.

Manipuri Pony

- **About:** The Manipuri Pony Meitei Sagol, is a traditional **Indian breed of small horse or pony** from Assam and Manipur in north-eastern India. It appears both in the history and the mythology of Manipur, and was used for warfare and polo.
 - It is **one of five recognised equine breeds** of India, and has a powerful cultural significance for Manipuri society.
 - It is featured in mythological stories, and is celebrated in oral tradition, ballads, and rituals. Historically an important part of Manipuri armies, it is used only for cavalry, rituals, and sport, not for working as a draught animal
- **Efforts for its conservation:** The Marjing Polo Complex has been developed as a way to conserve the Manipur Pony.
 - The state government has released **Manipur Pony Conservation and Development Policy 2016**.

Manipuri Pony and Modern Polo

- Modern polo is said to have originated **from Sagol Kangjei, a sport indigenous to Manipur**, in which players ride horses, specifically the Manipur Ponies, which are referenced in records dating back to the 14th century.
- The British learned of polo during the nineteenth century while watching it played on Manipuri ponies in India.



legal mining in Sariska

SC has been trying to stop illegal mining in and around Sariska tiger reserve since 1991. It has been thwarted for reasons that include uncertainty about the reserve's borders. A new order presents another opportunity

JAY MAZOOMDAR
NEW DELHI, MAY 16

THE SUPREME Court has ordered the Rajasthan government to shut 68 mines operating within a 1-kilometre periphery of the critical tiger habitat (CTH) of the Sariska reserve. The order, passed on May 15, is the latest of many attempts by the country's top court since the 1990s to halt the mining of marble, dolomite, and limestone in Sariska in violation of laws. Both the Wildlife Protection Act, 1972 and Environment Protection Act, 1986 prohibit quarrying in and around a tiger reserve.

In the 1990s

In May 2005, the SC ordered the CBI to investigate the disappearance of tigers from the reserve in the Aravalli range, halfway between Delhi and Jaipur. That was almost a decade and a half after the court first took up the issue of illegal mining in Sariska. In October 1991, in a PIL filed by a local NGO, the SC issued an interim order that "no mining operation of any nature shall be carried on in the protected area of Sariska, and set up a fact-finding committee under the chairmanship of Justice M L Jais, a retired judge of the High Court.

Based on a "razed map" provided by the Forest Department, the Rajasthan government found in 1992 that the protected area covered "about 800 sq km". In April 1993, the SC ordered the closure of 262 mines within that area.

In the 2000s

Ten years later, the Central Empowered Committee (CEC) of the SC submitted a damning report on mining around the Jaipur-Ramgarh Sanctuary which is part of the Sariska tiger reserve. The following year, the NGO Gao Foundation approached the SC with a complaint about a similar situation in Goa.

In September 2005, the SC laid down rules for issuing temporary mining permits in forest areas. In August 2006, it said, "an interim measure, one-kilometre safety zone shall be maintained subject to the orders that may be made... regarding Jaipur-Ramgarh Sanctuary". But the mines were back in business in 2008 after the Rajasthan government claimed that the sanctuary boundary had been demarcated, and allowed quarries out



Quarry in operation in the core area of the Sariska tiger reserve. by Mazoomdar

side the 100-metre periphery of the sanctuary. The state took to the 100-metre regulation in its draft Eco-Sensitive Zone (ESZ) notification for Sariska in 2011.

Meanwhile, in January 2002, the Indian (now National) Board for Wildlife had proposed to notify areas within 10 km of national parks and sanctuaries as ESZs. But after several state governments expressed concerns, the board had asked them, in May 2005, to identify suitable areas and submit proposals for site-specific ESZs.

After many states failed to respond, the SC intervened in December 2006. The court warned that if the states failed to respond within four weeks, it might have to consider the original plan of ESZs of 10-km width.

In the 2010s

In September 2012, the CEC submitted a report on ESZs that went beyond Sariska. In January 2013, it followed up with a supplementary note on the "immediate delay" in notifying the safety zones.

The SC put its foot down in April 2014. Its judgment in the Gao Foundation case underlined that the August 2006 order "has not been varied subsequently nor any orders made regarding Jaipur-Ramgarh", and that "the order... saying that there will be no mining activity within one-kilometre safety zone... has to be enforced".

But it took another four years for the SC to act on its 2006 order. In December 2018, not-

for the areas lent to such concerns, revenue villages are alleged to have been arbitrarily included in the tiger reserve, impinging on the rights of residents.

A decade after Sariska became a tiger reserve in 1978, Rajasthan issued mining leases inside the reserve to many who had obtained no objection certificates (NOCs) from the then field director of Sariska, even though he did not have any authority to issue such NOCs. In 1993, Rajasthan's proposal to compensate for three illegal mines by adding 3 sq km of revenue land to the reserve was rejected by the SC. But the "swag" happened anyway, according to two retired forest officials who have served in the Alwar district.

Uncertain boundaries

The area statement records submitted to the SC in 1993 did not tally with the accompanying map. The discrepancies were so glaring that the survey was constrained to add a face-saver on the map: "Prepared by me as per the direction of PD (Forest Department), PT (Project Tiger), Sariska."

In 1999, the Sariska management claimed to have lost several land records. The forest bosses in Jaipur then borrowed the said records from the Revenue Department, which in 2001 claimed these documents were never returned.

In August 2008, when Rajasthan approached the Survey of India to undertake the demarcation work in Sariska, the then state forest head wrote in a letter that "the exact boundary, including the location of pillars, is not known". Survey of India backed out of the job because Rajasthan failed to provide reliable maps and records.

In the absence of demarcated boundaries, Sariska's Tiger Conservation Plan could not be finalised until 2014-15 when the state finally prepared a map for "management purposes" with a disclaimer against its legal authenticity.

Another opportunity

A senior official in the Rajasthan Forest Department said the latest SC order was yet another opportunity to thwart illegal mining in the state. "Whatever mistakes were made in the past can be set right by demarcating the no-go zones around Sariska and also other mining affected reserves of the state," he said. The case comes up again in July.

WPA 1972 & EPA 1986

(Syllabus: GS Paper 3 – Environment)

Context: The Supreme Court recently ordered the Rajasthan government to close 68 mines operating within a 1-kilometer radius of the Sariska reserve's critical tiger habitat, as both the Wildlife Protection Act, 1972 and Environment Protection Act, 1986, prohibit such quarrying.

Wildlife Protection Act, 1972

- **About:** It establishes a legislative framework for the preservation of various wild animal and plant species. It also encompasses the management of habitats, regulation of trade in species' parts, and control of products manufactured from them.
- **Classification under the Act:** The act includes schedules categorizing plants and animals, subjecting them to different levels of government protection and oversight.
- **India's Inclusion in CITES:** The Wildlife Act played a crucial role in India's admission to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).
- **Constitutional Provisions:** Article 48A of the Indian Constitution mandates the State to safeguard and improve the environment, including the protection of wildlife and forests.
- This provision was added by the 42nd Amendment in 1976.
- **Section 29:** Only such activities can be carried out in national parks and sanctuaries which are for the betterment of wildlife. Mining is not one of such activities

Sariska Tiger Reserve

- **About:** A prominent wildlife sanctuary and national park located in the Alwar district of Rajasthan, India. The park is a part of the Aravalli Range.
- **Establishment:** It was declared a wildlife sanctuary in 1955.
 - Later, it was designated as a Tiger Reserve under Project Tiger in 1978.
 - The wildlife sanctuary was declared a national park in 1982.
- **Vegetation:** Dry deciduous forests, thorn scrubs, and grasslands.

Environment Protection Act, 1986

- **About:** The EPA, 1986 establishes a framework for studying, planning, and implementing long-term environmental safety measures.
- **Origin:** The EPA was influenced by the United Nations Conference on the Human Environment held in Stockholm in June 1972, where India committed to improving the human environment.
- **Constitutional Provisions**
 - **Article 253:** The EPA was enacted under Article 253 of the Indian Constitution, which allows for legislation to give effect to international agreements.
 - **Article 48A:** This article mandates that the State shall protect and improve the environment and safeguard forests and wildlife.
 - **Article 51A:** This article provides that every citizen has a duty to protect the environment.

Balancing two forms of SNCA protein could help manage Parkinson's

Today, Parkinson's is treated symptomatically by increasing the levels of dopamine or more drastically, by grafting new neurons in place of dead ones. A solution based on the SNCA protein is more desirable because it will offer a more sustainable resolution.

Somdatta Karak

Synuclein alpha (SNCA) is a mysterious protein. It's present in healthy cells but we don't know what it does there. It is notorious for its involvement in age-related neurodegenerative diseases. Twenty seven years ago, researchers first associated SNCA with Parkinson's disease. People with this disease lose neurons that communicate with each other using dopamine as a neurotransmitter in a part of their brains.

These dopaminergic neurons have been found to contain aggregated masses of proteins called Lewy bodies. Most of these proteins are SNCA.

Since then, researchers have reported SNCA to similarly aggregate in the brains of people with other neurodegenerative diseases as well. But its presence is most prominent in brains with Parkinson's. SNCA is abundant in neurons, especially in dopaminergic neurons. It is found near the nuclei of these cells and at the junctions between two neurons. It's capable of misfolding as well as forming filamentous structures. So are most other proteins, which take up predictable three-dimensional structures. SNCA can fold in multiple ways. Misfolded proteins don't function correctly.

But beyond these observations, researchers don't understand the dynamics of the formation of the aggregates and how exactly they affect neurons.

Two populations

A recent study from Imperial College London's Sir Alexander Fleming Centre for Cellular and Molecular Biology.

Hyderabad, published in the journal of Cell Science, reported two ways in which SNCA is present as aggregates in cells: one that interferes with the structural integrity of cells' nuclei and another that allows the cell to degrade misfolded proteins. The researchers found that the former are related to diseased states while the latter is important for healthy cells. As such, the study highlights the importance of striking a balance between these two SNCA populations to manage Parkinson's disease.

The researchers cultivated neurons outside a living body, providing them with nutrients in a laboratory setting. In these neurons, they artificially created structures resembling Lewy bodies by adding some amount of misfolded SNCA, called seeds.

Over time, they found two SNCA populations in the cells: one was around the nuclei, shaped like filaments tens of



A protein called synuclein alpha is notorious for its involvement in age-related neurodegenerative diseases. (with images/stockphoto)

micrometres long, much like Lewy bodies. The other population was also around the nuclei but as much smaller clumps called aggregates. Such aggregates are formed when cells localise misfolded proteins into a small bunch like collecting the trash in a corner for further processing.

Reaching the nucleus
They noticed that the Lewy-body-like structures formed very slowly. Most of the time, the aggregates took up the SNCA proteins and didn't allow the Lewy-body-like structures to grow. But in their experiment, when the researchers repeatedly seeded neurons with misfolded SNCA, the Lewy-body-like structures formed faster and became big enough to affect other parts of the cell. At one point, they became too populous for the aggregates to mitigate their prevalence.

The enlarged Lewy-body-like structures were situated at the periphery of the nuclei of the cells, and the researchers have argued that this damages the nuclear envelope. Sometimes, the structures also entered the ruptured nucleus.

A nucleus is the control centre of the cell. It contains the cell's genetic material, and is the seat of delivery of this genetic material and its utilisation to make proteins. So it is logical that the accumulation of misfolded SNCA would render the nucleus dysfunctional and eventually kill it. In addition, Lewy-body-like structures can pass from one cell to another, so the effect could cascade to neighbouring cells as well.

Dr. Rajchaudhuri's team was able to cross-check its findings in mice with Lewy-body-like structures in their brains. They reported that the increasing prevalence of these structures induced conditions mimicking Parkinson's disease. They also found that all the cells so affected also had damaged nuclear envelopes.

A therapeutic target?
Many Parkinson's disease researchers are focused on reducing the prevalence of SNCA in neurons as a therapeutic measure. Researchers are going about this in various ways, but haven't yet found one that has been approved for sale.

One way is to reduce the cells' SNCA content. A smaller population of SNCA means fewer misfolded SNCA, too. Researchers have achieved this by stopping the SNCA gene from expressing itself or by destroying the SNCA protein inside cells, once the cells make them. However, either of these interventions needs to happen only in select locations: if all the SNCA everywhere is taken away, the animal body will die. Another workable solution has been to

use a gene-silencing tool, like CRISPR-Cas9, at a precise location. Researchers have tried this method in cell cultures and mice models. But a significant challenge is to cross the blood-brain barrier, a lipid that filters the blood that goes into the brain, and which would also prevent a component CRISPR from passing through.

To surmount this barrier, some researchers have tried to inject molecules that inhibit the SNCA gene through the skull, directly into the desired brain region. Others have used small molecules like modified viruses to beat the barrier. Some researchers have also identified enzymes that degrade proteins in select brain cells, but with varying efficacy.

Another possibility is to stop SNCA from forming large aggregates. Dr. Rajchaudhuri has suggested balancing the SNCA population between aggregates and Lewy bodies. The more SNCA that goes into the aggregates, the less there will be available to make Lewy bodies. How this can be achieved is still being worked out.

Even if any one of these methods succeeds, it will transform the way Parkinson's disease is treated today. Today, Parkinson's is treated symptomatically by increasing the levels of dopamine or, more drastically, by grafting new neurons in place of dead ones. An SNCA-based solution is more desirable because it offers a more sustainable resolution.

Somdatta Karak, PhD, leads science communication and public outreach at CSIR Centre for Cellular and Molecular Biology.)

THE GIST

SNCA is abundant in neurons, especially in dopaminergic neurons. It is found near the nuclei of these cells and at the junctions between two neurons. It's capable of misfolding as well as forming filamentous structures. Misfolded proteins don't function correctly.

A study reported two ways in which SNCA is present: one that interferes with the integrity of cells' nuclei and another that allows the cell to degrade misfolded proteins. The former are related to diseased states while the latter is important for healthy cells.

A smaller population of SNCA means fewer misfolded SNCA. Researchers achieved this by stopping the SNCA gene from expressing itself or by destroying the SNCA protein inside cells. Either of these interventions needs to happen only in select locations: if all the SNCA is taken away, the body will die.

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Somdatta Karak, PhD, leads science communication and public outreach at CSIR Centre for Cellular and Molecular Biology.)

SYNUCLEIN ALPHA (SNCA) (Syllabus: GS Paper 3 – Sci and Tech)

Context: Recently, many Parkinson's disease researchers have focused on reducing **SNCA protein** levels in neurons as a therapeutic strategy.

Synuclein Alpha (SNCA) Protein

- **About:** It is a mysterious protein, notorious for its involvement in age-related neurodegenerative diseases.
- **Localization in Neurons:** It is abundant in neurons, especially in dopaminergic neurons found near the nuclei of these cells and at the junctions between two neurons.
 - It's capable of misfolding as well as forming filamentous structures.
- **Structural Variability:** Unlike most other proteins, which take up predictable three-dimensional structures, SNCA can fold in multiple ways.
- **Functional Impairment:** Misfolded proteins don't function correctly.
- **Tissue Distribution:** It is abundant in the brain, while smaller amounts are found in the heart, muscle, and other tissues.

Parkinson's Disease

- **About:** Simply Parkinson's, is a long-term neurodegenerative disease of the central nervous system that affects both the motor system and non-motor systems.
- **Symptoms:** Slowed movements (bradykinesia), Tremor while muscles are at rest, Rigidity or stiffness, and Unstable posture or waking gait.
- **Treatment:** There is no cure for Parkinson disease.
- **World Parkinson's Day:** Every year, 11th April is observed as World Parkinson's Day.

AP-born Gopi 1st Indian to go to space as tourist

Andhra-born Gopi Thota-Akura made history on Sunday as he became the first Indian citizen to enter space as a tourist. He was part of the crew for Blue Origin's NS-25 mission, reports Surendra Singh. Gopi, an entrepreneur & a pilot, flew to space with Ed Dwight (90), now the oldest man to go to space, and four others. **P12**



Context: Recently, Andhra-born Gopi Thota-Akura made history as the first Indian citizen to enter space as a tourist, participating in Blue Origin's NS-25 mission.

New Shepard-25 (NS-25) Mission

- **About:** It is a sub-orbital spaceflight mission, **operated by Blue Origin**, which was launched on 19 May 2024 using the New Shepard rocket.
 - The 25th mission in the New Shepard program will carry six astronauts beyond the edge of space before bringing them back to Earth.
- **Launches from:** Launch Site One, located in the high desert of West Texas near Van Horn.

New Shepard

- **About:** Reusable rocket system crafted to transport astronauts and research payloads beyond the **Karman line**.
 - **Karman line:** It is a boundary 62 miles (100 kilometers) above mean sea level that borders end of Earth's atmosphere and the beginning of space.
 - It is a conventional definition of the edge of space. It is not universally accepted.
- **Development:** Developed by **Blue Origin** as a fully reusable sub-orbital launch system **specifically for space tourism**.
- The name "New Shepard" is inspired by Alan Shepard, the **first American astronaut to travel into space**.
- **Reusability:** New Shepard is a fully reusable rocket system, designed to be launched multiple times without significant refurbishment.
- **Environmental Impact:** Nearly 99% of New Shepard's dry mass is reused, including the booster, capsule, engine, landing gear and parachutes.
 - New Shepard's engine is fuelled by highly-efficient liquid oxygen and hydrogen.
 - During flight, the only byproduct is water vapour with no carbon emissions.

Astronomers discover new Earth-sized world orbiting an ultra-cool star

Red Dwarf Stars

- **About:** These are the most common type of star in the Milky Way galaxy.
- **Characteristics:** Smaller and cooler than the Sun, with surface temperatures ranging from about 2,200 to 3,500 Kelvin.
- **Long Lifespans:** Red dwarfs have exceptionally long lifespans due to their slow consumption of nuclear fuel, making them valuable for studying planetary evolution and habitability over extended periods.



Context: An international team of astronomers recently detected a new, **Earth-sized planet named SPECULOOS-3b**, just 55 light years away, orbiting an ultra-cool red dwarf star.

SPECULOOS-3b

- **About:** It is an Earth-size planet orbiting an ultracool red dwarf star located 55 light-years away from Earth.
- **Unique Characteristics:** Despite being similar in size to Jupiter, the red dwarf emits light 100 times dimmer than the sun and has half the temperature.
- **Rare Discovery:** It is only the second planet of its kind discovered around this type of star.
 - The discovery was made by the SPECULOOS project, led by the University of Liège, Belgium, in collaboration with several other institutions, using an observatory in the Atacama Desert of Chile.
 - The SPECULOOS project aims to identify exoplanets orbiting ultra-cool dwarf stars through a network of robotic telescopes worldwide.
- **SPECULOOS-3b receives high levels of radiation from its sun,** potentially leaving the planet without an atmosphere, receiving nearly 16 times more energy per second than Earth.
- **Orbital Characteristics:** It takes approximately 17 hours for SPECULOOS-3b to complete an orbit around its star.

Beware of vishing: How not to fall prey to voice call frauds

Context: Recently, the government issued a circular cautioning its employees about the emergence of sophisticated cybercrime tactics like vishing.

Vishing

- **About:** It is the short form of "voice" and "phishing," executed through phone calls on mobile or landline devices.
- **Methodology:** Threat actors initiate vishing by calling victims and coaxing them into interacting with malicious files or emails, often leading to seemingly legitimate websites requesting personal information.
- **Information:** Attackers may directly request sensitive information from victims during the call.
- **Targeted Data:** Typically, vishing attacks aim to obtain financial details, passwords, or other private information.
 - Vishing attackers may impersonate authority figures or acquaintances, leveraging urgency to persuade victims to disclose sensitive information.
- **Telltale signs:** A pre-recorded message, Asking for sensitive information, Pretending to be a government official, Using fear and urgency tactics and Poor audio quality.

Other Types of Phishing Attacks

- **Spear Phishing:** This type of phishing is directed at specific individuals or companies, hence the term spear phishing.
- **Clone Phishing:** It involves mimicking a previously delivered legitimate email and modifying its links or attached files to trick the victim into opening a malicious website or file.
- **HTTPS phishing:** An HTTPS phishing attack is carried out by sending the victim an email with a link to a fake website. The site may then be used to fool the victim into entering their private information.
- **Evil twin phishing:** In an evil twin attack, the hacker sets up a false Wi-Fi network that looks real. If someone logs in to it and enters sensitive details, the hacker captures their info.

Most U-5 deaths in India now occur in early & post-neonatal periods: Study

From 33.5 In '93, Deaths Dipped To 6.9/1k Kids In '21

Durgesh Nandan Jha
@timesgroup.com

New Delhi: Majority of deaths among children under the age of five in India are now occurring during early neonatal period (first 7 days) and post-neonatal period (29 days to 11 months), a new study published in JAMA Network Open claimed.

The study is based on analysis of over 2.3 lakh deaths of under-5 children documented in five rounds of National Family Health Sur-

A stagnation or worsening for certain states and UTs was observed from 2016 to 2021 for early neonatal, late neonatal, post-neonatal mortality; if this continues, these states and UTs will not meet United Nations Sustainable Development Goal targets, the study said

vey (NFHS), the results of which were released in 1983, 1999, 2006, 2016 and 2021.

According to the study, deaths among children experienced the most substantial decrease between 1993 and 2021, from 33.5 to 6.9 deaths per 1,000, accompanied by a substantial reduction in inter-state inequalities.

The researchers sub-divided child mortality rates into four early-life periods: early-neonatal (first 7 days), late-neonatal (8-28 days), post neonatal

(29 days to 11 months), and child (12-59 months).

They found that while early neonatal (from 33.5 to 20.3 deaths per 1,000), late neonatal (from 14.1 to 4.1 deaths per 1,000), and post neonatal (from 31.0 to 10.8 deaths per 1,000) mortality decreased, inter-state inequalities remained notable.

"Mortality burden shifted over time, and it is now concentrated during the early-neonatal (48.3% of total deaths in children younger than 5 years) and post-neonatal (25.6%) peri-

ods," the researchers point out.

"A stagnation or worsening for certain states and UTs was observed from 2016 to 2021 for early-neonatal, late-neonatal, and post neonatal mortality. If this pattern continues, these states and UTs will not meet United Nations Sustainable Development Goal (SDG) targets related to child survival," they added.

SDGs of UN include reducing mortality in the first 5 years to 25 deaths per 1,000 live births and the first 28 days to 12 deaths per 1,000 live births by 2030. Researchers from Harvard, University of Toronto and IIT Mandi among others set targets for different-aged periods also to provide a general sense of the progress for various states/UTs.

Context: The majority of deaths among children under the age of five in India are now occurring during the early neonatal period (first 7 days) and post-neonatal period (29 days to 11 months), a new study published in JAMA Network Open claimed.

Key Points of Study

- **Significant Reduction:** Deaths among children decreased substantially from 33.5 to 6.9 deaths per 1,000 between 1993 and 2021, marking a significant improvement.
- **Division of Child Mortality Rates:** Researchers categorized child mortality rates into four distinct early-life periods: early-neonatal, late-neonatal, post neonatal, and child.
- **Decline in Specific Period Mortality:** Mortality rates decreased in early neonatal (from 33.5 to 20.3), late neonatal (from 14.1 to 4.1), and post neonatal (from 31.0 to 10.8) periods.
- **Shifting Mortality Burden:** Majority of child deaths (48.3%) now occur during the early-neonatal period, followed by post-neonatal period (25.6%), highlighting a shift in mortality burden over time.
- **Concerns:** Certain states and Union Territories (UTs) exhibited stagnation or worsening trends in early-neonatal, late-neonatal, and post neonatal mortality from 2016 to 2021, risking non-fulfillment of UN Sustainable Development Goal (SDG) targets.
- **UN SDG Targets:** UN SDGs aim to reduce child mortality to 25 deaths per 1,000 live births within the first 5 years and 12 deaths per 1,000 live births within the first 28 days by 2030.

Neonatal Period

- **About:** It is the first 4 weeks of a child's life. It is a time when changes are very rapid.
- Neonatal refers to the period of a new-born's life, which typically lasts from birth until 28 days of age.

STRATEGY & FOCUS NEED OF THE HOUR

➤ Deaths among children experienced the most substantial decrease between 1993 and 2021, from 33.5 to 6.9 deaths per 1,000

➤ The SDGs of the UN include reducing mortality in the first 5 years to 25 deaths per 1,000 live births and the first 28 days to 12 deaths per 1,000 live births by 2030

➤ 21 states did not meet SDG target with respect to reducing the early-neonatal mortality rate to 7 per 1,000 live births in 2021

➤ At least 17 states did not meet SDG target with respect to reducing the post-neonatal mortality rate to 8 per 1,000 live births in 2021

➤ Researchers found that while early neonatal (from 33.5 to 20.3 deaths per 1,000), late neonatal (from 14.1 to 4.1 deaths per 1,000), and post neonatal (from 31.0 to 10.8 deaths per 1,000) mortality also decreased, inter-state inequalities remained notable



Three-day elephant census in southern States from May 23

The Hindu Bureau
THIRUVANANTHAPURAM

A synchronised elephant population estimation will be held across South India for three days from May 23.

The field assessment forms a key aspect of the resolutions put forth by the inter-State Coordination Committee, comprising Kerala, Tamil Nadu and Karnataka, aimed at addressing human-wildlife conflict through joint action and intelligence sharing.

Andhra Pradesh too will join in the collaborative exercise.

The heads of the Forest departments of the four States had recently met online to discuss the methodology for conducting the census.

Methods

The enumeration will commence with block count sampling (or direct count) method on the first day, where forest divisions will be divided into sample blocks ranging from four to six sq. km. On the second day, the indirect 'dung count' (or line transect) method will be employed, estimating elephant numbers based on dung density and its distance from transects (or straight lines up to 2 km covered on foot for data collection) in elephant habitats. The third day will focus on the waterhole count method, identifying waterbodies frequented by the elephants.

In Kerala, the elephant population estimation will span approximately 610 sample blocks across the



Volunteers and forest staff engaged in elephant census work in Bandipur. FILE PHOTO

Anamudi, Nilambur, Periyar and Wayanad elephant reserves, with special attention to areas bordering Tamil Nadu and Karnataka, Chief Wildlife Warden D. Jayaprasad said.

The assessment will also observe elephant movement towards various waterholes, considering the varying degrees of animal concentration in different regions.

A preliminary report will be drafted by June 23, followed by the submission of the final report to the State government by July 9.

Last year's estimation block count and dung count methods recorded 1,920 and 2,386 elephants, respectively, significantly lower than the counts in 2017 (3,322 and 5,706 respectively). The Forest Department, which maintained that its findings in 2023 were "more precise" than those recorded in the previous surveys, attributed this decline to migration patterns influenced by climate and the 957 km of shared borders among Kerala, Tamil Nadu and Karnataka.

Context: An elephant census in the border areas of Karnataka, Tamil Nadu, Kerala, Telangana, and Andhra Pradesh will be held from May 23 to 25.

Elephant Census

- **About:** This census exercise will be limited to only the bordering areas to identify conflict areas and chalk out better solutions.
- **Objective:** to understand the area, and the conflict and chalk out better policies for better coordination and future planning.
 - This is the first time such an exercise is being carried out.
- **Outcome:** It is the outcome of the inter-state coordination committee meeting in Bandipur Tiger Reserve.
 - The inter-state meeting was held after a radio-collared tuskless male (makhana) killed a man in Wayanad, Kerala.
- **Geographical Focus in Karnataka:** Kolar, Bannerghatta National Park, Cauvery Wildlife Sanctuary, MM Hills (all bordering Tamil Nadu), Bandipur Tiger Reserve (bordering Tamil Nadu and Kerala), Nagarhole Tiger Reserve (bordering Kerala), and all three divisions of Kodagu.
 - The other forest divisions of the state are not included in this exercise.

Methods

- **Block Count Sampling Method:**
 - On the first day, the enumeration will begin with the block count sampling method.
 - Forest divisions will be divided into sample blocks ranging from 4 to 6 sq km.
- **Dung Count Method:**
 - The second day will utilize the indirect 'dung count' method.
 - Elephant numbers will be estimated based on dung density and its distance from transects.
 - Data collection will involve covering straight lines up to 2 km on foot.
- **Waterhole Count Method:**
 - The third day will focus on the waterhole count method.
 - Identification of waterbodies frequented by elephants will be the primary objective.

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